

REMARKS

In an Office Action dated May 23, 2003, the Examiner provisionally rejected claims 1 and 11 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 11 of copending Application No. 10/161,280; and rejected claims 1-27 under 35 U.S.C. §103(a) as obvious over Kuhara et al. (U.S. Patent 5,787,215) in view of Miura et al. (U.S. Patent 6,170,996).

Provisional Double Patenting

With regard to the provisional double patenting rejection, applicant notes that the copending application was filed later than the present application, and has not yet been allowed. Applicant therefore considers it likely that the present application will be in condition for allowance and issue before the copending application, making the provisional double patenting rejection moot. Applicant therefore chooses to defer any response to the provisional double patenting rejection, until such time, if ever, that a response should become necessary.

Prior Art

Applicant has amended independent claims 1, 11 and 15 to include the limitation that the optoelectronic device is an encapsulated device. Independent claim 22 is unamended. As amended, all claims are patentable over the cited art.

As explained in response to the previous action, applicant's invention relates to the construction of optoelectronic modules. Generally, an optoelectronic module is a device which forms an interface between an optical fiber and a digital electronic device. Various designs for such modules exist, but one common family of design approaches involves the use of encapsulated optoelectronic devices (generally either receivers or transmitters) which are seated in a housing, the housing also mounting a lens and maintaining a predetermined distance and

orientation between the optoelectronic device and the lens. Conventionally, these modules have been constructed by positioning the optoelectronic device with respect to the housing and bonding the optoelectronic device to the housing where the two structures meet, i.e., along a rim or flange of the optoelectronic device, well away from the path of light. Applicant has observed that this technique sometimes causes fogging or other problems in the cavity formed in the housing between the optoelectronic device and the lens. Applicant's invention provides an improved design, whereby the cavity is essentially filled with an optically transmissive adhesive, preventing air and moisture from being in the cavity. Preferably, this requires re-design of the lens to accommodate the higher index of refraction of the adhesive.

It is useful therefore to emphasize that applicant's invention is directed to solving a problem associated with a particular form of optical module design, i.e., one in which a housing creates a cavity between an optoelectronic device and a lens. This design is typically used with encapsulated optoelectronic devices, such as TO-cans, in order to maintain the proper distance and orientation of the lens with respect to the device. Applicant's invention requires minimal change to the basic design of the module.

Kuhara discloses an optoelectronic module having the basic elements of a housing, optoelectronic device and a lens. However, *Kuhara* does not disclose an adhesive interface in the space between the optoelectronic device and the lens. *Miura* discloses a optoelectronic module, in which a transparent resinous encapsulant is used for encapsulating the active elements of an optoelectronic device, the encapsulant also being formed at one boundary in a convex shape, to serve as a focusing lens. The Examiner reasons that the recited elements of applicant's invention are found in the combination of *Kuhara* and *Miura*.

Notwithstanding that both references relate to similar subject matter, the ultimate question must always be whether there is a suggestion in the art to combine elements of the two references to form applicant's recited invention. Applicant submits that there is not.

The *motivation* for *Miura*'s design is to provide a reduced cost, compact module by combining the function of an encapsulant and a refractant. I.e., *Miura*'s resinous encapsulant serves to seal and protect the delicate active element of the optoelectronic device, and to provide a refracting surface for light either entering or leaving the optoelectronic device. This motivation is inapplicable to a device as claimed by applicant, nor is any motivation shown in *Miura* or *Kuhara* to apply an adhesive interface in a device as claimed by applicant.

Applicant's amended claim 1 recites:

1. An optical subassembly for an optoelectronic module, comprising:
 - a lens;
 - an encapsulated optoelectronic device;
 - a housing maintaining a predetermined gap between said lens and said encapsulated optoelectronic device;
 - an adhesive interface positioned in said gap between and in physical contact with the lens and the encapsulated optoelectronic device.

Claim 11 contains analogous limitations.

In an optoelectronic module design which employs (a) an *encapsulated* optoelectronic device; and (b) a *lens* separated from the optoelectronic device by a pre-defined gap determined by the housing, there would be no motivation to apply *Miura*'s resinous encapsulant. Filling a pre-existing gap with an adhesive, as recited in the claim, will not make the device any smaller, nor will it reduce the number of parts required to build the device. The motivations shown in *Miura* for the encapsulant, the protection and sealing of the active element of the optoelectronic device, and refraction of light, are absent. Since the *encapsulated* device (preferably a TO-can, as recited in dependent claims 28-30) is already protected and sealed, this motivation is inapplicable.

Furthermore, since a pre-positioned lens is also recited, the secondary motivation to refract light is also inapplicable.

In summary, for an optoelectronic subassembly design *having the specific limitations as claimed in claim 1*, there is no motivation shown in the references to use an encapsulant as disclosed in *Miura* to fill the gap between the optoelectronic device and the lens. Without the specific motivation taught by applicant's disclosure, filling the pre-existing gap would serve no purpose, and merely add cost and complexity to the device. Without such a motivation, the combination of references to establish a prima facie showing of obviousness is improper.

Claim 15 is a method claim, and although its limitations are phrased differently, it is patentable for similar reasons. Claim 15 also recites an "encapsulated optoelectronic device" and a separate lens which is positioned apart from the optoelectronic device by a housing. As in the case of claims 1 and 11, the motivations for using *Miura*'s resinous encapsulant, i.e., encapsulation and refraction, are not present when the optoelectronic device is already encapsulated, and when a separate lens is already provided for refracting light.

Claim 22 includes certain aspects of the optoelectronic module design in somewhat different terms. Claim 22 recites:

22. An optical subassembly for an optoelectronic module, comprising:
 - a housing defining an interior cavity;
 - a lens which refracts light passing between said interior cavity and outside said housing;
 - an optoelectronic device facing said interior cavity opposite said lens; and
 - an adhesive interface filling at least a portion of said interior cavity between said lens and said optoelectronic device, said adhesive interface being in physical contact with said lens and said optoelectronic device, wherein light passing between said optoelectronic device and said lens passes through said adhesive interface.

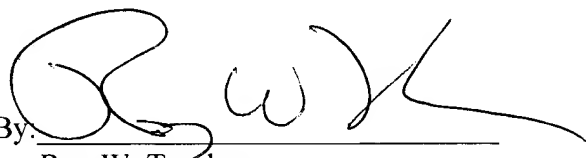
As can be seen, claim 22 recites a housing defining an interior cavity, in which the optoelectronic device is placed, and a separate lens for refracting light. As in the case of the previous claims, the housing defines the overall size of the device. Filling the housing with an adhesive or other compound will not reduce device size. Since the optoelectronic device is placed in a cavity created by the housing, a resinous encapsulant would appear to be superfluous. Since a separate lens is present, the resinous encapsulant is also not required for refraction of light. Neither *Miura* nor *Kuhara* disclose or suggest any motivation for filling an interior cavity defined by a housing with an adhesive interface, as recited in claim 22.

For all of the reasons stated above, applicant's independent claims are patentable over the cited art. The remaining claims are dependent, and patentable for the same reasons.

In view of the foregoing, applicant submits that the application is now in condition for allowance and issue, and respectfully requests reconsideration and allowance of all claims. In addition, the Examiner is encouraged to contact applicant's attorney by telephone if there are outstanding issues left to be resolved to place this case in condition for allowance.

Respectfully submitted,

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